

ACADEMIC OPINION

By assoc. prof. Anna Ivanova, PhD, Department of Philosophical Sciences, St Cyril and St Methodius University of Veliko Tarnovo, member of a scientific jury

Concerning:

The dissertation of Kaloyan Nechev entitled: “Emergent Structures and Functions in Molecular Biology and Neurobiology”, presented for the awarding of the scientific and educational degree “PhD” in professional domain 2.3. Philosophy (Philosophy of Science)

1. General information:

The dissertation is 167 pages long and consists of a title page, contents, introduction, four chapters, conclusion (a summary of the research’s results) and bibliography. The topic, according to the formulation of the title, is “Emergent Structures and Functions in Molecular Biology and Neurobiology”. 142 academic sources have been referenced, 22 of which are in Bulgarian and the rest – in English. The presented information about publications in the period of the PhD studentship signifies that the candidate conforms to the minimal national requirements for scientific and educational degree “PhD” as per the ZRASRB act. The Dissertation Abstract is suitable in length and correctly reflects the contents of the dissertation.

The research offers an interdisciplinary motivated naturalistic analysis of the notion of emergence in the context of a developed conception about natural kinds as reactional clusters. Essentially, a model of a natural kind has been elaborated, in which emergent properties have been positioned and later this model has been applied to a specific emergent form – the intuition with the goal to demonstrate the

model's productive role. Among the goals of the project are: elimination of some problems around the ontological status of emergent properties, achievement of better conceptual clarity, explanatory and theoretical economy etc. (p. 66 of the dissertation paper) It could be said that a major part of these goals have been achieved with regard to the key for the research concept of emergence.

2. Analytic review of the main contributions in the dissertation

In the first chapter of the dissertation, the author has examined the topic of emergence historically and systematically, has outlined the main views and the types of emergentist conceptions. In it, clearly and comprehensibly are formulated some difficult conceptual problems arising from the discontinuity between the metaphysical implications of the notion of emergence and the methodological framework of natural sciences. The analysis demonstrates profound knowledge of the main positions and authors and well supports the main thesis of the dissertation that "*the conceptual understanding of emergentism is highly theoretically loaded, often entering into irreconcilable contradictions*" (p. 3).

In view of the importance of the topic and the manner of its exposition, one could affirm that this part of the research is a contribution as an enrichment of the Bulgarian philosophical tradition in the philosophy of biology and ontology. Also, insofar as the topic is relevant to discussions within the philosophy of mind, it is fruitful, that a more thorough analysis of emergentism in the philosophy of biology has been brought to bear on the question about the ontological status of mental states, and of consciousness in general, as has been done in the dissertation research.

In the second chapter, the author has presented his conception of a natural species within the framework of the cluster approach, based on which he has proposed a re-definition of the concepts of emergent characteristics and emergentism. He has given a clear definition of the natural species as a "reactional cluster" - "a stable structure with reaction characteristics (p. 53) and has introduced measurable parameters of the cluster - "stability", "reaction volume", "reaction potential" and others. Within the framework of the model developed in this manner, he has defined emergence as "an enlargement of the reaction potential of a given structure/complex system, that stands in correlation to its net stability" (p. 62).

The idea of applying a definition of a natural kind for solving the conceptual problems of emergentism in general is, in my opinion, the contribution in the dissertation that deserves the highest attention. Given the nature of the studied phenomena, it seems appropriate to investigate a possible connection between the criteria for the distinction of natural kinds and the systemic characteristics most often defined as emergent in the ontology of the sciences. Besides this methodological contribution, some authors' definitions of cluster parameters deserve attention in this part. They lend clarity to the notion of emergence by empirically fixing particular aspects of natural kinds.

In the rest of the dissertation, the author has attempted to conjoin the normative problem of the epistemic value of intuition as a philosophical method and the question about its physiological foundations. The goal has been to apply the same interpretive analysis to a specific phenomenon of the emergentist kind so that the new conceptualization would lead to the resolution of related philosophical problems. In the third chapter, the methodological, behaviouristic by character (Skinner) framework of the analysis has been outlined. An interesting ('functional-physiological') definition of intuition (p. 89) is elaborated, as well as one about its

related terms while various candidates for physiological correlates are presented by reference to diverse evidence from the fields of neurobiology, neuroscience and cognitive science (i. 3.3.4.).

In this, most extensive, part of the dissertation, the author has demonstrated a rich scientific culture and a skill in applying unifying perspectives, which underlies the interdisciplinary approaches. The analysis concerns some of the types of intuitionism in analytic philosophy, but its realisation, apart from the purposes of the research, has a contribution to solving the topical metaphilosophical problem about the correct classification of the very diverse forms of reference to intuition in the philosophical argumentation, which would allow the exclusion of the illegitimate cases.

The fourth chapter comes back to the conceptual analysis, with some part devoted to the discussion of theoretical-methodological and epistemological problems. The thesis about the superiority of the scientific definition of intuition over that of natural language and, respectively, of everyday psychology is well-defended (pp. 129-137). At the end of the chapter, the new definition of intuition has been provided (p. 155). From the formulation, it seems to me, it is clear that the definitional framework developed by Nechev, in its capacity as a "method of cluster reaction analysis" has been successfully applied for the purposes of an innovative conceptual approach to the question of emergence.

3. General evaluation and conclusion

It can be summarized that Kaloyan Nechev's dissertation contains scientific results that represent a condition for awarding the educational and scientific degree "PhD". It is clear from the presented text that the candidate has in-depth theoretical

knowledge and the ability to conduct independent scientific research. The autobiographical report on his participation in scientific forums and other academic initiatives also indirectly testifies to the latter.

Based on these results, I give a positive assessment of the dissertation paper and declare my intention to vote "For" awarding the educational and scientific degree "PhD" to Kaloyan Nechev for his research "Emergent Structures and Functions in Molecular Biology and Neurobiology".

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